

## DOCUMENT RESUME

ED 263 908

IR 011 897

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TITLE When to Adapt Materials and When to Initiate Fresh Instructional Development.  
PUB DATE 22 Apr 85  
NOTE 12p.; Paper presented at the Annual Meeting of the National Society for Performance and Instruction (Chicago, IL, April 21-26, 1985).  
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)  
  
EDRS PRICE MF01/PC01 Plus Postage.  
DESCRIPTORS Academic Achievement; Adults; Comparative Analysis; \*Cross Cultural Studies; Developing Nations; \*Evaluation Methods; \*Formative Evaluation; \*Instructional Development; Instructional Material Evaluation; \*Media Adaptation; Problem Solving; Professional Personnel; \*Student Attitudes  
IDENTIFIERS Brazil; United States

## ABSTRACT

A study was conducted to examine the procedures and requirements of a formative evaluation when it is carried out for instructional materials that have been designed for a U.S. target audience, but which also have potential use by a population of another country, e.g., Brazil. The study concentrated on determining whether different formative evaluation procedures should be implemented, and, if so, identifying possible additional procedures to be carried out during evaluation. Two sample populations were used in the study: 49 U.S. and 49 Brazilian learners who were professionals in similar areas of expertise and training. The two groups were given an instructional module on problem solving which was produced in two languages, Portuguese and English. This performance on the module which contained a pretest, a posttest and an attitude questionnaire, was compared under three conditions: one-to-one, small group, and field trial evaluations. The two main dependent variables assessed were the characteristics of the feedback and the revision decisions. Findings indicated that: (1) the same evaluation procedures used to collect data to revise instructional materials designed for audiences that differ in cultural traits or values can be applied to that effect; (2) a carefully performed one-to-one evaluation that provides substantial data for modification of the instructional materials and small group evaluation may not be required; and (3) two extra procedures might prove useful: after initial translation to the required language, a second translation back to the original language to determine any improperly translated words, and material revision by evaluators prior to implementation to discover any cultural inadequacies. A list of references is appended. (JB)

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## WHEN TO ADAPT MATERIALS AND WHEN TO INITIATE FRESH INSTRUCTIONAL DEVELOPMENT

Paper presented at the NSPI-National Society for Performance in  
Instruction, April 22, 1985

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There is a great interest in the international market for hardware as well as software among both technologically-advanced and less-developed countries. Instructional materials are generally high in demand however, due to their usage by different clientele with different cultural traits as well as language, they may require some modifications for potential users to adopt them.

The application of formative evaluation procedures to improve instructional products according to the characteristics of the users has been widely recognized by educational researchers (e.g., Baker & Alkin, 1973; Briggs, 1970, 1977; Cronbach, 1963; Dick, 1977, 1980; Dick & Carey, 1978; Gagne & Briggs, 1979; Markle, 1967, 1983a, 1983b; Scriven, 1967). In the literature reviewed, however, no study was found dealing with the appropriate procedures to be used when a set of materials developed for certain audiences are used by another clientele that differs in cultural traits and values.

The purpose of the study being reported in this article was to examine the procedures and requirements of a formative evaluation when it is carried out on instructional materials that have been designed for a U.S. target population, but which also have potential use by a population of another country. In considering this problem, the study focused in two target populations which differ in national traits, the United States and Brazil, and in determining if different cultural reactions are discernible through a formative evaluation process.

The study concentrated mainly on: 1) determining whether different formative evaluation procedures should be implemented; and 2) identifying possible additional procedures to be carried out during that type of evaluation.

### Description of the Procedures

There were two samples (49 U.S. and Brazilian learners) used in this study. The voluntarily participants were professionals in similar areas of expertise and training. Both groups included personnel such as teachers, nurses, administrators, professors, physicists, sociologists, artist, and engineers.

The U.S. group was comparable to the Brazilian group in terms of their educational level, sex, age, and the fact that each member of the group was native to his/her respective country.

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The instructional module, specially prepared for this study, was based on the 1982 version of Kaufman's book, Identifying and solving problems: A system approach (3rd. edition).

The sections selected were the ones related to the definition of needs, system approach, needs assessment, quasi-needs assessment, internal and external needs assessment, and the description of the Organizational Elements Model and its applications to individuals and organizations. The module which required a minimum of one hour and a maximum of two hours and a half for the learner to complete, is divided into four sections. Practice exercises were included after each of the first sections, followed by the correct answers as well as suggestions for carrying out the learning activities in case of disagreements or incorrect answers. The module also contained a pre-test, a post-test, and an attitude questionnaire that assessed the learner's attitude toward the learning materials and the content.

The instructional module was produced in two different languages: Portuguese and English. Both modules were reviewed and revised as per suggestions of Roger Kaufman, author of the needs assessment model presented in the module.

The study involved the comparison of two groups under three conditions of formative evaluation: one-to-one, small group, and field trial evaluations. The two main dependent variables assessed were the characteristics of the feedback and the revision decisions. In order to collect data about feedback, the following indicators were taken into account: learner achievement, learner reactions, learning time, learner attitude toward materials (in whole and party), and learner attitude toward the content.

The evaluation processes carried out in order to collect appropriate data were the one-to-one, small group and field trial. In the first stage, a group of five U.S. and five Brazilians participated. Fourteen students of each nationality took part in the small group evaluation. A larger number of students (29 for each group) cooperated in the final evaluation phase, the field trial.

The procedures consisted in performing (1) the one-to-one evaluation, analysis of the feedback obtained, revision of the materials accordingly; (2) the small group evaluation, data analysis, revision of materials; and (3) the field trial evaluation and analysis of the data in order to examine whether both groups performed equally and showed similar attitude toward the materials.

### Principal Findings

Two research questions were studied and a hypothesis was tested. The research questions examined the type of feedback provided by both groups of learners, and also determined the amount of modification required to revise the instructional

materials.

The hypothesis contrasted U.S. and Brazilians learners' performance levels and the attitude toward the materials.

#### Type of Feedback Provided

This first research question examined the quality and quantity of the different types of feedback provided by the two learner groups when exposed to the same instructional product and the same formative evaluation strategy for improving that product.

The data collected about feedback were analyzed, taking into account the following indicators: learner reactions, learning time, learner attitude toward the materials (as a whole and in part), and learner attitude toward the content.

Learner reactions and learning time. The total number of reactions obtained during the one-to-one evaluation was 85 from the American group and 85 from the Brazilian group.

These results were surprising. Since the materials were designed for U.S. learners, these students were not expected to have returned the greater volume of feedback. On the other hand, when these reactions were analyzed taking into account the three categories under which they were classified (instructional, format and content reactions), it was noted that most of the American learners' reactions identified inadequacies in format elements, such as typographical errors. The Brazilian version of the materials had been proofread by three people, while only one person proofread the English version. Therefore, during the one-to-one evaluation, feedback given by American learners (67 reactions) was higher than the Brazilian feedback (48 reactions). As a result of the small group evaluation, the number of this type of American feedback (25) was again higher than the feedback provided by the Brazilian students (5). During the process of revising the materials to incorporate these reactions, a team of three people worked on the Portuguese version, and only one person worked on the English version. This situation probably led to the smaller number of Brazilian feedback reactions recorded under the category of format decisions during the small group evaluation.

In the other two categories (instructional and content reactions) the trend was different.

For one-to-one evaluation the results of quantifying learner reactions indicated that the U.S. group provided 18 instructional reactions and 10 content reactions. Meanwhile their counterparts, the Brazilian group, have 24 content decisions and 13 instructional decisions.

The results regarding content reactions were as expected for the one-to-one evaluation. That is, it was assumed that there would be a higher number of Brazilian learner content reactions in order to adapt the content to their own cultural characteristics and values. It is interesting to note that the same situation did not occur during the small group evaluation.

The number of American content reactions (4) was higher than the number of Brazilian content reactions (1).

The same type of comments were expressed by the Brazilian students during the one-to-one and the small group evaluations. To the contrary, a higher number and different type of reactions were identified from the U.S. students. The U.S. group participating in the second evaluation phase had different points of view about the content than did the students in the first phase.

Both groups of learners were comparable in relation to education level, sex, age, and differed only in nationality. There was no data available regarding their political and philosophical preferences. It was noted that some of the Brazilian participants (two during the one-to-one evaluation and seven during the small group evaluation) were very critical about American culture, politics, and philosophy.

Also, during the small group evaluation some of the female American students (4) were quite irritated because they considered the content to be anti-feminist and sexist.

These observations lead to a recommendation for further research. A relevant variable of political, social and philosophical preferences should be considered when a set of instructional materials is to be implemented. Thus, misleading or inappropriate revisions can be avoided.

Regarding the instructional reactions, it was observed that the American students provided a higher number of reactions in that category than did their counterparts (18 American instructional reactions and 13 Brazilian ones during the one-to-one evaluation; 27 American and 19 Brazilian instructional reactions for the small group evaluation).

This result is probably due to the formation of the target samples. Even though equal numbers of graduate students in the Instructional Systems program were in both samples, the fact cannot be overlooked that the U.S. participants study at one of the best American universities that is internationally recognized as a major leader in its field.

Nevertheless, this situation only seemed to influence the number of instructional reactions, but not the quality of the reactions given and taken into account for improving the materials.

The instructional revision decisions that were made based on the U.S. learner feedback were equally as relevant as the instructional revision decisions made on the basis of the Brazilian learner feedback. With the exception of one instructional revision, the same revisions were made in both versions of the materials at the request of both learner groups.

This exception was regarding the type of test items included in the pretest. The purpose of the pretest was to assess the students' knowledge of Kaufman's Needs Assessment approach. The Brazilian learners participating in the one-to-one evaluation disliked both the type of test items and the request for information about their own preferences and information about

needs assessment and its application. Therefore, the Brazilian learners wanted to offer these opinions on the pretest. At the same time, most of the Brazilians (4 out of 7 learners) indicated that the items involving constructed responses were too annoying and that they preferred multiple-choice test items. There were several dropouts due to this factor. This was the only difference that could be found with respect to the pretest administered to both groups.

The U.S. learners reacted in a different way that is worthwhile to comment on here. Most of the participants (16 out of 29) did not continue reading the instrument after they had read the instructions of the pretest because they were not familiar with Kaufman's Needs Assessment model. It was observed that it was a predominant behavior for American students to be more concerned about what to do and how long it would take them to go through the module and to respond to both evaluation instruments than what kind of results were expected.

The Brazilian students were also concerned about what to do and how long the process would take, adding that they wanted to do it right. Possibly because of this situation, the average learning time of the Brazilian students was higher (3 hr. 59 min.) than the average time spent by the U.S. students (2 hr. 37 min.) during the one-to-one evaluation.

The format revision decisions made based on the U.S. learner feedback were more related to typographical errors than the format revision decisions made on the basis of the Brazilian feedback. The possible reason for this finding has already been discussed.

The content revision decisions made on the basis of U.S. learner feedback were less useful than the content revision decisions made on the basis of the Brazilian learner feedback. Five out of the 24 Brazilian content reactions were taken into account to modify the materials accordingly. Only one out of the 10 U.S. content revisions was introduced in the English version. This item coincided with one given by the Brazilian students.

Learner attitude toward the materials. The analysis of the data gathered through the attitude questionnaire indicated that as a result of the one-to-one evaluation the U.S. learners' attitude toward the materials as a whole was positive ( $X = 5.5$ ;  $SD = 0.7$ ) and the Brazilian learners showed a neutral attitude ( $X = 4.8$ ;  $SD = 1.3$ ).

When the revised materials were used by the small group evaluation participants, both groups showed a neutral attitude (American learners attitude  $X = 4.8$ ;  $SD = 0.7$ ; Brazilian learners attitude  $X = 4.3$ ;  $SD = 1.1$ ).

The results cannot be generalized due to the small size of the population ( $n = 14$ ), but present interesting information. Even when the materials are revised according to student feedback, the attitude toward the materials does not seem to shift from neutral to positive. This situation should be investigated in order to determine what causes this kind of behavior.

Learner attitude toward the content. The data obtained on learner attitude in relation to the applicability, usefulness, and originality of the content presented in the module studied indicated a neutral attitude about the content (U.S. learners one-to-one evaluation phase  $X = 4.4$ ,  $SD = 1.5$ ; small group  $X = 4.0$ ,  $SD = 0.9$ ; Brazilian learners,  $X = 4.8$ ,  $SD = 0.5$  and  $X = 3.5$ ,  $SD = 1.06$  respectively).

Amount of Modifications Required to Revise  
the Instructional Materials

The second research question examined if the instructional materials originally developed for the use of the U.S. students, when revised according to the data collected for Brazilian students, required a greater amount of modification than the materials revised solely according to data collected for the U.S. students.

It was thought that probably any set of instructional materials revised according to data gathered from a group of persons belonging to a culture other than that of the intended target group may require greater modification (in quantity as well as quality) than those materials revised only according to data obtained from an intended population. The English version of the materials required a total of 90 modifications and the Portuguese version 59 modifications. Thus, it can be concluded that the opposite of what was thought had occurred. However, if the modifications are carefully studied in terms of instructional, format and content revision decisions an interesting finding can be reported. In the case of the Portuguese version, of the 59 modifications carried out, 11 were in relation to instructional aspects, 43 to format elements, and 5 regarding content revisions.

If a detailed analysis of the format revisions is performed, it can be detected that 75 out of 79 American format revisions were due to misspelling of words, typographical and grammatical errors, as well as composition style changes. Only 2 out of these 79 revisions were related to art design modifications and cultural adaptation. The latter is worthwhile and will be discussed here. With respect to the case of the 43 Brazilian format revisions, 34 provided changes in misspelling words, typographical and grammatical errors, and composition style. Nine out of the 43 referred to art design modifications and cultural adaptation.

It was previously reported that the team in charge of developing the Portuguese version was composed of three persons, but only one person took care of that process for the materials in English. If a similar team would have been available for developing materials, it is possible that both versions might have been presented in similar format. Therefore, and as a matter of discussion the research question proposed, if the number of format revisions that account for the most common errors is subtracted from the total number of modifications, the

amount of revision required by the materials used by the Brazilian learners (24) is greater than the number of modifications required to improve the materials to be used by the U.S. learners (13).

In that case it can be stated, as a recommendation for further development of instructional products, that a team should be in charge of that process in order to manage and produce proofread materials.

An interesting event occurred during the evaluation of the English version of the materials. An American format reaction falls into the category of translation/cultural adaptation because the learners indicated that the form used to record the starting and finishing times in the module and in the post-test was not appropriate for the U.S. culture (i.e., It is ...h...m, instead of It is ...AM/PM).

Although the content was written by an American author, the instructions, the exercises, and the evaluation instruments were prepared by a non-American who evidently introduced an element of her own culture.

This situation can probably be avoided if an inter-cultural and disciplinary team instead of only one individual belonging to another culture participates in the development of instructional materials to be used by a certain target population.

#### Comparison Analyses of Learning Achievement and Attitude Toward the Materials.

The research hypothesis predicted that when the two groups, Brazilian and U.S. learners, were trained with instructional materials which were of the same content and format, and diverse only in language, the two groups will not differ in achievement, learning time, or attitude toward the materials. After the materials were modified according to the feedback obtained from each group, there were used under the prescribed conditions during the field trial evaluation.

The analysis of the post-test scores through an ANOVA test determined that there was not any significant difference in terms of achievement ( $F(1.56) = 0.5$ ,  $p .05$ ). Thus, this result supports the null hypothesis of no difference in the performance of the two groups. However, it should be noted that both groups performed poorly on the post-test.

It was found that the U.S. students attained an average of 7 out of the 24 specified objectives, and the Brazilian learners satisfactorily accomplished an average of 8 out of 24 objectives presented in the materials. In summary, both groups of learners performed equally and showed a neutral attitude toward the materials when exposed to training materials which were the same in format and content, differing only in language and modifications to accommodate the materials to their own cultural characteristics.

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### Conclusions

This study concentrated on (1) determining whether different formative evaluation procedures should be implemented when learning materials are used by different cultural groups, and (2) identifying possible extra procedures to be carried out during that type of evaluation.

It can be concluded that:

(1) The same evaluation procedures used to collect data to revise instructional materials designed for audiences that differ in cultural traits or values can be applied to that effect. These procedures were also found useful in identifying different cultural responses to instructional materials originally developed for other potential users. These cultural differences were related to format aspects as well as values system even within the each culture.

(2) The results obtained suggest that a carefully performed one-to-one evaluation provides substantial data for modification of the instructional materials. Therefore, the small group evaluation may not be required.

(3) Two extra procedures that can be considered as useful are:

(a) After the translation from English to the required language is done, a new translation should be executed, putting the materials back into English. In this way it might be possible to detect some words that have not been translated properly due to the lack of appropriate terms in the translated language to match with the concepts presented; lack of understanding of the concept(s) by the translator(s), or the use of native words that do not have the same connotations they do in English language.

(b) Prior to the implementation of the materials under the designed conditions, the materials should be revised by a team of evaluators to determine if any cultural inadequacy has been unintentionally introduced into the materials by the designer(s) who might not belong to the same culture as the potential users. This procedure should be considered even when learning materials are developed to be used by an intended population.

### Recommendations for Further Research

The results reported and the observations recorded during the development of the study are useful sources to determine possible areas of further research.

During the data collection process, it was observed that although the students who voluntarily participated were, in most cases, willing to do so, they were not happy about the length of time required to go through the materials ( $X = 2$  hrs 30 min). The students also realized that in order to effectively learn the concepts and tools presented in the module, they required a longer period of time that they felt they could afford. In addition, results indicated that students' performance were not satisfactory, and the U.S. learners, as well as the Brazilians, showed a neutral attitude toward the content and the materials.

The failure to satisfactorily acquire the concepts may have negatively influences learners' attitudes.

Therefore, further research should examine whether there is any significant difference in learning achievement and learners attitude toward the content and materials when both student groups, U.S. and non-U.S. learners, are made to go through the materials as a course requirement. A satisfactory level of performance should be expected as well as a positive attitude toward the materials. There should be also a better understanding of the content (Kaufman's Needs Assessment approach) by both participant groups.

The instructional module presented to the students in this study had some improbable instructional elements. The U.S. and the Brazilian learners identified those weak points already recognized by the designer but comments regarding the cultural adaptations were not specified beforehand as a purpose of this study.

Regarding the formative evaluation phases, this study is consistent with findings of others that materials revised using student data from one-to-one evaluation alone are not substantially different from the materials revised using a combination of one-to-one and small groups student data.

Other research indicates that there are no significant differences in the learning achievement when students used materials revised by peers or by instructional designers. The cost of revisions and development of the materials, however, drops drastically without using student data.

Therefore, it seems that these researchers have indicated a trend: when high quality instructional materials are given to students, a reduction in time, expenses, and in the workforce should be expected. Regarding modification of materials due to student data, the only type of reactions that may be expected are those related to wording errors, composition style or to illustration preferences, providing that the learners and the designer(s) have the same cultural background, and the designer(s) is (are) knowledgeable about the content.

High quality instructional materials are those that take into consideration a wide range of target population characteristics including cultural traits and values, applied research dealing with cognitive learning strategies, and the instructional theory in general. Thus, a study may be conducted with the purpose of determining if there are any significant differences in learning achievement between students using a good instructional material (prepared and revised according to instructional designer data without having gone through the costly formative evaluation process of three phases) and the learners using an instructional product revised using student data after three phases of formative evaluation.

Another variable to be investigated in that proposed study is the learners' attitude toward the content and the materials. This may result in a positive correlation between satisfactory performance and a positive attitude as well as as a better, or at

least equal, performance level for the students that learned the materials developed by an instructional design team and the students learning from revised materials based on learners' feedback. The findings may well change the way that training and educational materials are designed, developed, and evaluated. These changes will be dealing with different points of view about the appropriate skills required by an instructional design team, the importance of using the costly formative evaluation process, and an awareness of the influence of cultural variables.

One of the aspects that is not generally present in the documentation of instructional materials is a clear and complete description of the target population. Most of the products specify educational level, or job responsibilities (e.g., trainers of such and such organization, sophomore students, nurses, etc.) but no emphasis is given to personality characteristics, cognitive learning styles, social, political, philosophical, and religion preferences. In this study there were some strong learner reactions against the content as well as to some of the illustrations. These students seemed to have a series of preferences that differed from the author's. In this case, the feedback given, as well as the attitude demonstrated were negative. Meanwhile, some students of the same group felt that the author had read their minds and was able to express what they believed or are already applying or promoting at their institutions.

The implications of this type of negative feedback given by students whose values differ from those represented in the content, and modifications done using this data should be studied. Should a larger number of participants hold different beliefs and attitudes, the data analysis may lead to inappropriate decisions regarding improvement of the materials and/or content, and for further implementation of these materials.

Additional research is suggested to determine the implications of this issue in the effective development of learning materials. The findings will be useful to developers as well as to implementers of controversial topics.

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